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ment, and Captain Baudesson calls them "half civilized." The Moï have a legend that Mother Eve told those of her sons who were jolly fellows and fond of good living to settle on the fertile plains; but to one of her sons, a quiet and sober lad, she gave a bow and arrows and the kingdom of the mountains where the wild beasts roam. He was the ancestor of the Moï, who, the author says, may number nearly 400,000.

The Cham, on the other hand, supposed to number about 130,000 souls, have approached a little nearer to what we call civilization. They are Mohammedans and have preserved their physical and moral characteristics largely because they do not intermarry with other peoples. But retrogression is in progress. They are indolent, have no ambition, hire the Annamites to build their rude houses, and, at the same time, are proud of the ruins of splendid edifices erected long ago by their forefathers. The author also points to striking resemblances between customs and superstitions among the blacks of central Africa and the lower classes among these Asian peoples.

CYRUS C. ADAMS

MORPHOLOGY OF THE ALTAI MOUNTAINS

J. G. GRANÖ. **Les formes du relief dans l'Altaï russe et leur genèse: étude morphologique.** Maps, ill., bibliogr. *Fennia*, Vol. 40, No. 2, pp. 1-125. Helsingfors, 1917-19.

No more striking example of the explanatory treatment of mountain forms has appeared in recent years than the above article by the Finnish geographer, Granö, of the University of Helsingfors. The northwestern or Russian part of the Altai Mountains between the upper courses of the Obi and Irtysh Rivers—an area measuring 400 kilometers northeastward by 350 northwestward—is described as consisting of an uplifted and dislocated peneplain in a more or less advanced stage of erosion, the peneplain having been produced over a vast area by long-continued normal erosion of greatly deformed structures, and its undisturbed extension being still seen in the piedmont steppes to the northwest. The least dissected part of the uplifted peneplain forms a series of barren, tundra-like highlands, which occupy the greater part of the southeastern half of the region at altitudes of from 2,000 to 2,300 meters. The small amount of dissection that the highland peneplain has suffered, apart from the deep valleys which traverse it, is because its altitude is such that during the glacial period it was covered for the most part by a sluggish ice sheet and thus protected from active erosion. The highlands are surmounted by mountains of various kinds. Some are of subdued forms, apparently residual ranges still surviving from the cycle of peneplanation (these presumably follow the trend of resistant structures); the smaller isolated residuals are dulled monadnocks. But there are also lofty ranges of Alpine form, from 50 to 100 kilometers or more in length and from 2,400 to 4,000 meters in altitude, with extensive snow fields on their upper slopes and good-sized glaciers in their valleys; these ranges usually trend east and west, out of accord with the folded structure of the region, and are regarded as blocks of the peneplain which were dislocated by faulting and raised so high that they have been strongly carved by normal and glacial erosion. Some of the less elevated ranges still exhibit remnants of the peneplain surface along their crests; others have all their sharpened summits at about the same level; but in the most lofty ranges no trace of the peneplain remains. The frontier between Russian and Chinese territory follows several of the lofty ranges which here constitute the divide between Arctic and interior river systems.

Almost half of the region lies exterior to the barren highlands at altitudes decreasing northwestward from 2,000 to 500 meters; here, although the uplifted peneplain is preserved along certain divides, it is for the most part maturely dissected by normal erosion to mountainous or submountainous forms, which are richly grass-covered on certain southern slopes, but generally forested. The piedmont peneplain has a width of from 40 to 70 kilometers; its gently undulating, treeless surface, here and there rising in low and somewhat craggy mounts, is almost intact at altitudes of 300 or 400 meters, but the larger rivers have recently incised their courses moderately beneath its surface. Farther northwest the vast Siberian plains are covered with sand and clay deposits.

The valleys of the Altai in the forested mountainous or sub-mountainous area are usually V-shaped and so narrow-floored that they do not serve well as paths of travel. But the upper valleys of the larger rivers and their chief branches which head in the Alpine region and continue through the highlands appear to have been followed by active glaciers,

as they now have the form of glacially overdeepened troughs. The greater troughs extend into the maturely dissected area, where they terminate at altitudes of about 400 meters. The earlier view of certain observers that the trough valleys are due to faulting is examined and rejected. Their open floors are more available for travel than the narrow bottoms of the V-shaped valleys, and they serve here and there as sites for the winter villages of the nomadic natives, when the highlands are snow-covered. Certain branch valleys are broadly floored with alluvial deposits, as if they had held temporary lakes while their trunk valleys were occupied by glaciers. On the other hand, several rather extensive intermont basins, occupied by smoothly aggraded alluvial plains, are ascribed to down-faulting and thus are the opposites of the strongly elevated blocks in the lofty ranges.

This valuable article, of which the preceding paragraphs give only a condensed abstract, calls for several comments. It is in the first place pre-eminently intelligible. The landscapes that it describes in outline can be at once visualized with satisfactory definiteness as to their essential qualities. The general concepts thus gained are then elaborated and given quantitative values in order to adapt them to specific instances. This intelligibility, to which the explanatory terminology so largely contributes, is however somewhat obscured by an argumentative manner of presentation on many pages. This manner appears to have been adopted because of the author's well-grounded wish to modify, if not to combat, the conclusions of a number of earlier explorers, some of whom seem to have been little informed as to modern physiographic principles. Such argumentative presentation is a natural characteristic of the developmental stage of an advancing science, when opinions are in a formative state. A more concise form of explanatory presentation will be generally utilized when the majority of explorers reach essential agreement as to the manner of describing land forms; indeed, such conciseness is already adopted by Granö in certain summaries near the close of his article. Had these summaries been placed at the beginning, his readers might have had the enjoyment of following the author's descriptions and discussions while bearing his well-formed conclusions in mind; for, however cautiously and inductively an observer may wish to establish his conclusions, mature and expert readers will be best satisfied if they are told the main conclusions before they read the evidence that leads to them. Geometers have long known and acted on this principle; geographers might profitably adopt it.

A subordinate difficulty in reading the text is the free use of local names, which, although most of them are represented on an outline map, are mentioned without sufficient indication of their position in the region under discussion. Where the matter is so excellent, one must wish that the method should be of a correspondingly high order.

It is only in regard to forms of a special class that the treatment is defective, these are the fault scarps by which the lofty ranges are believed to be limited. In a region that has been recently and rapidly elevated and dislocated, and in which the highest ranges are defined by faults, fault scarps, even though for the most part destroyed by erosion, might still be visible in series of spur-end facets which should stand in simple alignment independent of structure along the base of the ranges. True, one range according to the description of another observer, is said to "rise like a wall"; but mountain-side walls are so battered and breached that fuller description is desirable; and in the case of fault-block ranges observed by Granö himself fuller description might have been advantageously given. This is a small deficiency of an exceptionally valuable essay.

W. M. DAVIS

A SEAMAN IN THE ANTARCTIC

J. K. DAVIS. **With the "Aurora" in the Antarctic, 1911-1914.** xxii and 183 pp.; maps, diagrs., ills., index. Andrew Melrose, London, [1920]. 18 s. 9½ x 7 inches.

Three different methods of exploration have been employed to wrest her secrets from the icebound southern continent. Two of these, dealing with the polar plateau and with land journeys along the coast, have been described in many well-known books. It has remained for Captain John King Davis to tell us of the third in his recent book "*With the Aurora in the Antarctic.*"

Here we find the story of his unrivaled oceanographic work in the waters between Australia and Antarctica during the Australasian expedition of 1911-1914. Although in other expeditions valuable results were gained by the exploring vessels during their cruises in